

## Deployment of Autonomous GPS Stations in Marie Byrd Land, Antarctica

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During the 1998–1999 Antarctic field season, we installed three autonomous GPS stations in Marie Byrd Land, West Antarctica to measure glacio-isostatic rebound and rates of spreading across the West Antarctic Rift System. The systems collect data throughout the entire year and therefore must function during the warm, relatively mild summer, and cold, harsh winters. They are powered by gel cell batteries that are charged by wind and solar power. The system includes dual data logging capability. We log data at 5 minute intervals within the receiver and at 30 second intervals to a serial data logger. We do not require 365 days of continuous data for well determined crustal velocities, but rather long periods ( $> 24$  hours) of continuous data distributed throughout the year. Therefore, for simplicity, we designed the system to accept occasional data interruptions. The batteries, in addition to supplying power, act as a thermal capacitive heat storage device to help regulate the temperatures within the system. This storage system absorbs the majority of the 10–15 watts of power from the receiver and 5 watts from the data logger which helps to maintain temperature for long periods of time. Power is switched off when the temperature within the system enclosure reaches  $50^{\circ}\text{C}$  and is reconnected at  $20^{\circ}\text{C}$ . If battery voltage drops too low the batteries will freeze. Therefore, we cut the power off when the batteries drop to a low voltage of 12.45V. Power is restored at 13.2V. The temperature and power hysteresis allows for a minimum of several days of data to be collected before system shutdowns. A check of all three stations in late January 1999 indicated that the thermal and power control systems are performing as expected. We plan to implement satellite telemetry to the systems during the 2000–2001 season following a year of development.

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